Amendments to the Claims

1. (Currently Amended) A method of scaling a halftone image using error diffusion, the method comprising:

identifying a first matrix of n x m pels in the halftone image;

calculating an average intensity of the first matrix of pels;

generating a second matrix of (n+1) x m pels from the first matrix of pels by inserting a line of pels in the first matrix of pels;

generating a scaled output matrix of (n+1) x m pels from the second matrix of pels by assigning new pel values to each pel in the line of pels using an error diffusion process, wherein the average intensity of the scaled output matrix of pels is substantially unchanged from the average intensity of the first matrix of pels; and

performing the previous steps for each unidentified matrix of n x m pels in the halftone image to generate a scaled output of the halftone image.

~~A method for providing a halftoned image comprising the step of:~~

~~scaling the halftoned image by performing pel repetition utilizing an error diffusion algorithm such that artifacts are minimized.~~

2. (Currently Amended) The method of claim 1 further comprising:

generating a (n+1) x m shift matrix based on the second matrix and including at least one shift indicator defining an exchange between a pel and its neighboring pel, wherein a probability of occurrence of the at least one shift indicator in a position of the (n+1) x m shift matrix is proportional to a distance between the position and the line of pels in the second matrix; and

exchanging at least one pel in the scaled output matrix with its neighboring pel based on the shift matrix.

~~wherein nxm pel blocks of an image are scaled to n+1xm pel blocks by inserting single pels in each block at locations distributed through the block according to the error-diffusion algorithm, with values chosen such that the average intensity of the block is substantially unchanged.~~

3. (Currently Amended) The method of claim [[1]] 2 wherein no pel in the first matrix of pels is shifted more than one position from its neighboring pels to generate the scaled output matrix.
~~no pel from a nxm pel block is shifted more than one position from its neighboring pels in the scaled (n+1xm) block~~.

4. (Currently Amended) The method of claim [[3]] 2 wherein no pel in the first matrix of pels is shifted more than once to generate the scaled output matrix.
~~the nxm pel block is shifted by a shifting matrix.~~

5. (Currently Amended) The method of claim 1 wherein the error diffusion process comprises:

identifying a n' x m' matrix of pels around each pel in the line of pels, wherein n' > n and m' > m; and

assigning each new pel value in the scaled output matrix of pels using a threshold based on an average intensity calculation of of pel values in the n' x m' matrix of pels.
~~2 wherein a threshold matrix is utilized to maintain the average intensity of a block.~~

6. (Currently Amended) The method of claim 1 wherein the error diffusion process comprises:

identifying a n' x m' matrix of pels around each pel in the line of pels, wherein n' > n and m' > m; and

assigning each new pel value in the scaled output matrix of pels based on a calculation of a rounded weighted mean of pel values in the n' x m' matrix of pels.
~~A printing system for providing a halftoned image comprising:~~

~~a storage device for providing a continuous tone (contone) image;~~

~~a spooler for receiving the contone image and converting the image to a halftoned image;~~

~~a scaler for scaling the halftoned image by performing pel repetition utilizing a error diffusion algorithm such that artifacts are minimized; and~~

~~a printer for receiving the halftoned image and printing the image.~~

7. (Currently Amended) A system operable to scale a halftone image using error diffusion, the system comprising:

a spooler operable to convert a contone image into the halftone image for processing; and

an error diffusion scaler operable to identify a first matrix of n x m pels in the halftone image, to calculate an average intensity of the first matrix of pels, to generate a second matrix of (n+1) x m pels from the first matrix of pels by inserting a line of pels in the first matrix of pels, to generate a scaled output matrix of (n+1) x m pels from the second matrix of pels by assigning new pel values to each pel in the line of pels using an error diffusion process, wherein the average intensity of the scaled output matrix of pels is substantially unchanged from the average intensity of the first matrix of pels, and to perform the previous steps for each unidentified matrix of n x m pels in the halftone image to generate a scaled output of the halftone image.

~~The system of claim 6 wherein the scaler is within the printer.~~

8. (Currently Amended) The system of claim 7 wherein the error diffusion scaler is further operable to generate a (n+1) x m shift matrix based on the second matrix and including at least one shift indicator defining an exchange between a pel and its neighboring pel, wherein a probability of occurrence of the at least one shift indicator in a position of the shift matrix is proportional to a distance between the position and the line of pels in the second matrix, and to exchange at least one pel in the scaled output matrix with its neighboring pel based on the shift matrix.

~~6 wherein nxm pel blocks of an image are scaled to n+1xm pel blocks by inserting single pels in each block at locations distributed through the block according to the error diffusion algorithm, with values chosen such that the average intensity of the block is substantially unchanged.~~

9. (Currently Amended) The system of claim 8 wherein no pel in the first matrix of pels is shifted more than one position from its neighboring pels to generate the scaled output matrix.

~~6 wherein no pel from a nxm pel block is shifted more than one position from its neighboring pels in the scaled (n+1xm) block.~~

10. (Currently Amended) The system of claim 8 wherein no pel in the first matrix of pels is shifted more than once to generate the scaled output matrix.

~~9 wherein the nxm pel block is shifted by a shifting matrix.~~

11. (Currently Amended) The system of claim 7 wherein the error diffusion process comprises:

identifying a n' x m' matrix of pels around each pel in the line of pels, wherein n' > n and m' > m; and

assigning each new pel value in the scaled output matrix of pels using a threshold based on an average intensity calculation of of pel values in the n' x m' matrix of pels.

~~8 wherein a threshold matrix is utilized to maintain the average intensity of a block.~~

12. (Currently Amended) The system of claim 7 wherein the error diffusion process comprises:

identifying a n' x m' matrix of pels around each pel in the line of pels, wherein n' > n and m' > m; and

assigning each new pel value in the scaled output matrix of pels based on a calculation of a rounded weighted mean of pel values in the n' x m' matrix of pels.

~~A computer readable medium containing program instructions for providing a halftoned image, the program instructions for:~~

~~scaling the halftoned image by performing pel repetition utilizing an error diffusion algorithm such that artifacts are minimized.~~

13. (Currently Amended) A computer readable medium tangibly embodying programmed instructions which, when executed by a computer system, are operable for performing a method of scaling a halftone image using error diffusion, method comprising:

identifying a first matrix of n x m pels in the halftone image;

calculating an average intensity of the first matrix of pels;

generating a second matrix of (n+1) x m pels from the first matrix of pels by inserting a line of pels in the first matrix of pels;

generating a scaled output matrix of (n+1) x m pels from the second matrix of pels by assigning new pel values to each pel in the line of pels using an error diffusion process, wherein the average intensity of the scaled output matrix of pels is substantially unchanged from the average intensity of the first matrix of pels; and

performing the previous steps for each unidentified matrix of n x m pels in the halftone image to generate a scaled output of the halftone image.

~~The computer readable medium of claim 12 wherein nxm pel blocks of an image are scaled to n+1xm pel blocks by inserting single pels in each block at locations distributed through the block according to the error diffusion algorithm, with values chosen such that the average intensity of the block is substantially unchanged.~~

14. (Currently Amended) The computer readable medium of claim 13 wherein the method further comprises:

generating a (n+1) x m shift matrix based on the second matrix and including at least one shift indicator defining an exchange between a pel and its neighboring pel, wherein a probability of occurrence of the at least one shift indicator in a position of the shift matrix is proportional to a distance between the position and the line of pels in the second matrix; and

exchanging at least one pel in the scaled output matrix with its neighboring pel based on the shift matrix.

~~12 wherein no pel from a nxm pel block is shifted more than one position from its neighboring pels in the scaled (n+1xm) block.~~

15. (Currently Amended) The computer readable medium of claim 14 wherein no pel in the first matrix of pels is shifted more than one position from its neighboring pels to generate the scaled output matrix.

~~the nxm pel block is shifted by a shifting matrix.~~

16. (Currently Amended) The computer readable medium of claim [[13]] 14 wherein no pel in the first matrix of pels is shifted more than once to generate the scaled output matrix.

~~a threshold matrix is utilized to maintain the average intensity of a block.~~

17 (New) The computer readable medium of claim 13 wherein the error diffusion process comprises:

identifying a n' x m' matrix of pels around each pel in the line of pels, wherein n' > n and m' > m; and

assigning each new pel value in the scaled output matrix of pels using a threshold based on an average intensity calculation of pel values in the n' x m' matrix of pels.

18. (New) The computer readable medium of claim 13 wherein the error diffusion process comprises:

identifying a n' x m' matrix of pels around each pel in the line of pels, wherein n' > n and m' > m; and

assigning each new pel value in the scaled output matrix of pels based on a calculation of a rounded weighted mean of pel values in the n' x m' matrix of pels.